

WHAT IS CLAIMED IS:

1. A high-frequency semiconductor device comprising:  
a ceramic substrate;  
5 an element group including semiconductor elements and passive components mounted onto a bottom portion of the ceramic substrate; and  
a composite resin material layer formed on the bottom portion of the ceramic substrate so as to bury the element group;  
wherein the composite resin material layer is formed by a composite  
10 resin material including an epoxy resin and an inorganic filler material, and the composite resin material layer has a flat bottom surface on which electrodes for connecting to the outside are formed.
2. The high-frequency semiconductor device according to claim 1,  
15 wherein the semiconductor elements are mounted by flip-chip connection.
3. The high-frequency semiconductor device according to claim 2,  
wherein interlayer connector structures are formed in the composite resin material layer, the interlayer connector structures being filled with a high  
20 thermal conductivity resin material having thermal conductivity higher than that of the epoxy resin, the electrodes for connecting to the outside include a ground electrode that functions as a heat release electrode, and a surface of the semiconductor elements is connected to the ground electrode via the interlayer connector structures.
- 25 4. A high-frequency semiconductor device comprising:  
a first ceramic substrate having a circuit pattern;  
a second ceramic substrate on which semiconductor elements are mounted; and  
30 a composite resin material layer that buries the semiconductor elements and is provided between the first ceramic substrate and the second ceramic substrate;  
wherein the composite resin material layer is formed by a composite resin material including an epoxy resin and an inorganic filler material,  
35 interlayer connector structures in which a conducting resin material has been filled are formed in the composite resin material layer, and the circuit pattern of the first ceramic substrate and a circuit pattern of the second ceramic

substrate are electrically connected via the interlayer connector structures.

5        5.        The high-frequency semiconductor device according to claim 4,  
         wherein the semiconductor elements provided on the second ceramic  
         substrate are mounted by flip-chip connection.

         6.        The high-frequency semiconductor device according to claim 5,  
         wherein at least one of the semiconductor elements provided on the second  
         ceramic substrate is connected by a metal wire.

10       7.        The high-frequency semiconductor device according to claim 6,  
         wherein the surroundings of the semiconductor elements provided on the  
         second ceramic substrate and connected by the metal wire are sealed by a  
         liquid epoxy resin.

15       8.        A high-frequency semiconductor element comprising:  
         a ceramic substrate having a cavity portion in its bottom portion;  
         an element group including semiconductor elements and passive  
         components mounted to the bottom portion of the cavity portion;  
20       a composite resin material layer formed so as to bury the element  
         group in the cavity portion; and  
         electrodes for connecting to the outside that are formed on a bottom  
         portion of the ceramic substrate other than at the cavity portion;  
         wherein the composite resin material layer is formed by a composite  
25       resin material including an epoxy resin and an inorganic filler material, and  
         a bottom portion of the composite resin material layer is flat in shape.